Claims:

1. A method for generating a peptide with a selected biological activity, comprising the steps of:
   (i) providing a peptide display library comprising a variegated population of test peptides expressed on the surface of a population of display packages;
   (ii) in a display mode, isolating, from the peptide display libary, a sub-population of display packages enriched for test peptides which have a desired binding specificity and/or affinity for a cell or a component thereof;
   (iii) in a secretion mode, simultaneously expressing the enriched test peptide sub-population under conditions wherein the test peptides are secreted and are free of the display packages; and
   (iv) assessing the ability of the secreted test peptides to regulate a biological process in a target cell.

2. The method of claim 1, wherein the peptide display library is a phage display library.

3. The method of claim 2, wherein the display packages of the phage display library are phage particles selected from a group consisting of M13, f1, fd, If1, Ike, Xf, Pf1, Pf3, λ, T4, T7, P2, P4, ϕX-174, MS2 and f2.

4. The method of claim 2, wherein the phage display library is generated with a filamentous bacteriophage specific for *Escherichia coli* and the phage coat protein is coat protein III or coat protein VIII.

5. The method of claim 4, wherein the filamentous bacteriophage is selected from a group consisting of M13, fd, and f1.

6. The method of claim 1, wherein the peptide display library is a bacterial cell-surface display library or a spore display library.

7. The method of claim 2, wherein test peptides are enriched from the peptide display library in the display mode by a differential binding means comprising

affinity separation of test peptides which specifically bind the cell or component thereof from test peptides which do not.

8. The method of claim 7, wherein the differential binding means comprises panning the peptide display library on whole cells.

9. The method of claim 7, wherein the differential binding means comprises an affinity chromatographic means in which a component of a cell is provided as part of an insoluble matrix.

10. The method of claim 9, wherein the insoluble matrix comprises a cell surface protein attached to a polymeric support.

11. The method of claim 7, wherein the differential binding means comprises immunoprecipitating the display packages.

12. The method of claim 1, wherein the display mode enriches for test peptides which bind to a cell-type specific marker.

13. The method of claim 1, wherein the display mode enriches for test peptides which bind to a cell surface receptor protein.

14. The method of claim 13, wherein the receptor protein is a G-protein coupled receptor.

15. The method of claim 14, wherein the G-protein coupled receptor is selected from the group consisting of: a chemoattractant peptide receptor, a neuropeptide receptor, a light receptor, a neurotransmitter receptor, a cyclic AMP receptor, and a polypeptide hormone receptor.

16. The method of claim 14, wherein the G-protein coupled receptor is selected from the group consisting of: α1A-adrenergic receptor, α1B-adrenergic receptor, α2-adrenergic receptor, α2B-adrenergic receptor, β1-adrenergic receptor, β2-adrenergic receptor, β3-adrenergic receptor, m1 acetylcholine receptor (AChR), m2 AChR, m3 AChR, m4 AChR, m5 AChR, D1 dopamine receptor, D2 dopamine receptor, D3 dopamine receptor, D4 dopamine receptor, D5 dopamine

receptor, A1 adenosine receptor, A2b adenosine receptor, 5-HT1a, 5-HT1b, 5HT1-like, 5-HT1d, 5HT1d-like, 5HT1d beta, substance K (neurokinin A), fMLP receptor, fMLP-like receptor, angiotensin II type 1, endothelin ETA, endothelin ETB, thrombin, growth hormone-releasing hormone (GHRH), vasoactive intestinal peptide, oxytocin, somatostatin SSTR1 and SSTR2, SSTR3, cannabinoid, follicle stimulating hormone (FSH), leutropin (LH/HCG), thyroid stimulating hormone (TSH), thromboxane A2, platelet-activating factor (PAF), C5a anaphylatoxin, Interleukin 8 (IL-8) IL-8RA, IL-8RB, Delta Opioid, Kappa Opioid, mip-1/RANTES, Rhodopsin, Red opsin, Green opsin, Blue opsin, metabotropic glutamate mGluR1-6, histamine H2, ATP, neuropeptide Y, amyloid protein precursor, insulin-like growth factor II, bradykinin, gonadotropin-releasing hormone, cholecystokinin, melanocyte stimulating hormone receptor, antidiuretic hormone receptor, glucagon receptor, and adrenocorticotropic hormone II.

17. The method of claim 13, wherein the receptor protein is a receptor tyrosine kinase.

18. The method of claim 17, wherein the receptor tyrosine kinase is an EPH receptor.

19. The method of claim 18, wherein the receptor is selected from the group consisting of: *eph*, *elk*, *eck*, *sek*, *mek4*, *hek*, *hek2*, *eek*, *erk*, *tyro1*, *tyro4*, *tyro5*, *tyro6*, *tyro11*, *cek4*, *cek5*, *cek6*, *cek7*, *cek8*, *cek9*, *cek10*, *bsk*, *rtk1*, *rtk2*, *rtk3*, *myk1*, *myk2*, *ehk1*, *ehk2*, *pagliaccio*, *htk*, *erk* and *nuk* receptors.

20. The method of claim 13, wherein the receptor protein is a cytokine receptor.

21. The method of claim 13, wherein the receptor protein is an MIRR receptor.

22. The method of claim 13, wherein the receptor protein is an orphan receptor.

23. The method of claim 1, wherein the peptide display library includes at least 10^3 different test peptides.

24. The method of claim 1, wherein the test peptides are 4-20 amino acid residues in length.

25. The method of claim 1, wherein each of the test peptides are encoded by a chimeric gene comprising (i) a coding sequence for the test peptide, (ii) a coding sequence for a surface protein of the display package for displaying the test peptides on the surface of a population of display packages, and (iii) RNA splice sites flanking the coding sequence for the surface protein, wherein, in the display mode, the chimeric gene is expressed as fusion protein including the test peptide and the surface protein, whereas in the secretion mode, the test peptide is expressed without the surface protein as a result of the coding sequence for the surface protein being removed by RNA splicing.

26. The method of claim 1, wherein the test peptides are expressed by a eukaryotic cell in the secretion mode.

27. The method of claim 25, wherein the eukaryotic cell is a mammalian cell.

28. The method of claim 1, wherein the target cell is a eukaryotic cell.

29. The method of claim 28, wherein the eukaryotic cell is a mammalian cell.

30. The method of claim 29, wherein the mammalian cell is a human cell.

31. The method of claim 1, wherein the biological process includes a change in cell proliferation, cell differentiation or cell death.

32. The method of claim 1, wherein the biological process is detected by changes in intracellular calcium mobilization.

33. The method of claim 1, wherein the biological process is detected by changes in intracellular protein phosphorylation.

34. The method of claim 1, wherein the biological process is detected by changes in phospholipid metabolism.

35. The method of claim 1, wherein the biological process is detected by changes in expression of cell-specific marker genes.

36. The method of claim 13, wherein the target cell further comprises a reporter gene construct containing a reporter gene in operative linkage with one or more transcriptional regulatory elements responsive to the signal transduction acitivity of the cell surface receptor protein, expression of the reporter gene providing the detectable signal.

37. The method of claim 36, wherein the reporter gene encodes a gene product that gives rise to a detectable signal selected from the group consisting of: color, fluorescence, luminescence, cell viability relief of a cell nutritional requirement, cell growth, and drug resistance.

38. The method of claim 37, wherein the reporter gene encodes a gene product selected from the group consisting of chloramphenicol acetyl transferase, beta-galactosidase and secreted alkaline phosphatase.

39. The method of claim 37, wherein the reporter gene encodes a gene product which confers a growth signal.

40. The method of claim 1, wherein the secretion mode includes expression of the test peptides by a host cell co-cultured with the target cell.

41. The method of claim 40, wherein the co-cultured host and target cells are separated by a membrane which is permeable to the test peptide.

42. The method of claim 1, wherein the secretion mode comprises assessing the ability of the secreted test peptides to inhibit the biological activity of an exogenously added compound on the target cells.

43. The method of claim 1, wherein: in step (ii), display packages which bind to endothelial cells are isolated; and in step (iv), the ability of the secreted test peptides to inhibit proliferation of endothelial cells is assessed.

44. The method of claim 43, wherein: in step (iv), the ability of the secreted test peptides to inhibit proliferation of endothelial cells in the presense of an angiogenic amount of an endogenous growth factor is assessed.

45. The method of claim 1, comprising the further step of converting into peptidomimietics, one or more test peptides which regulate the biological process in the target cell.

46. The method of claim 1 or 45, comprising the further step of formulating, with a pharmaceutically acceptable carrier, one or more test peptides which regulate the biological process in the target cell or peptidomimetics thereof.

47. An peptide display library enriched for test peptides having a desired binding specificity and/or affinity for a cell or a component thereof and which regulate a biological process in a target cell.

48. A vector comprising a chimeric gene for a chimeric protein, which chimeric gene comprises (i) a coding sequence for a test peptide, (ii) a coding sequence for a surface protein of a display package, and (iii) RNA splice sites flanking the coding sequence for the surface protein, wherein,

in a display mode, the chimeric gene is expressed as a fusion protein including the test peptide and the surface protein such that the test peptide can be displayed on the surface of a population of display packages,

whereas in the secretion mode, the test peptide is expressed without the surface protein as a result of the coding sequence for the surface protein being removed by RNA splicing.

49. The vector of claim 48, wherein the chimeric gene further comprises a secretion signal sequence for secretion of the test peptide in the secretion mode.

50. The vector of claim 49, wherein the secretion signal sequence causes secretion of the test peptide from eukaryotic cells.

51. The vector of claim 50, wherein the eukaryotic cells are mammalian cells.

52. The vector of claim 48, wherein the display package is a phage.

53. The vector of claim 52, wherein the phage is selected from a group consisting of M13, f1, fd, If1, Ike, Xf, Pf1, Pf3, λ, T4, T7, P2, P4, ϕX-174, MS2 and f2.

54. The vector of claim 52, wherein the phage is a filamentous bacteriophage specific for *Escherichia coli* and the surface protein is coat protein III or coat protein VIII.

55. The vector of claim 54, wherein the filamentous bacteriophage is selected from a group consisting of M13, fd, and f1.

56. A vector library, each vector comprising a chimeric gene for a chimeric protein, which chimeric gene comprises (i) a coding sequence for a test peptide, (ii) a coding sequence for a surface protein of a display package, and (iii) RNA splice sites flanking the coding sequence for the surface protein, wherein,

in a display mode, the chimeric gene is expressed as fusion protein including the test peptide and the surface protein such that the test peptide can be displayed on the surface of a population of display packages,

whereas in the secretion mode, the test peptide is expressed without the surface protein as a result of the coding sequence for the surface protein being removed by RNA splicing,

the vector library collectively encodes a variegated population of test peptides.

57. The vector library of claim 56, wherein the chimeric gene further comprises a secretion signal sequence for secretion of the test peptide in the secretion mode.

58. The vector library of claim 57, wherein the secretion signal sequence causes secretion of the test peptide from eukaryotic cells.

59. The vector library of claim 58, wherein the eukaryotic cells are mammalian cells.

60. The vector library of claim 56, wherein the display package is a phage.

61. The vector library of claim 60, wherein the phage is selected from a group consisting of M13, f1, fd, If1, Ike, Xf, Pf1, Pf3, λ, T4, T7, P2, P4, φX-174, MS2 and f2.

62. The vector library of claim 56, wherein the phage is a filamentous bacteriophage specific for *Escherichia coli* and the surface protein is coat protein III or coat protein VIII.

63. The vector library of claim 62, wherein the filamentous bacteriophage is selected from a group consisting of M13, fd, and f1.

64. The vector library of claim 56, wherein the vector library collectively encodes at least 10^3 different test peptides.

65. The vector library of claim 56, wherein the test peptides are 4-20 amino acid residues in length.

66. A cell composition comprising a population of cells containing the vector library of claim 56.

67. A method for generating a peptide with a selected antimicrobial activity, comprising the steps of:

(i) providing a recombinant host cell population which expresses a soluble peptide library comprising a variegated population of test peptides;

(ii) culturing the host cells with a target microorganism under conditions wherein the peptide library is secreted and diffuses to the target microorganism; and

(iii) selected host cells expressing test peptides that inhibit growth of the target microorganism.

68. The method of claim 67, wherein the target microorganism is a bacteria.

69. The method of claim 67, wherein the target microorganism is a fungus.

70. The method of claim 67, wherein the host cell is a bacteria.

71. The method of claim 67, wherein the host cells are cultured on agar embedded with the target microorganisms.

72. The method of claim 67, wherein the antimicrobial activity of the test peptide is determined by zone clearing in the agar.

73. The method of claim 67, wherein the peptide display library includes at least 10^3 different test peptides.

74. The method of claim 67, wherein the test peptides are 4-20 amino acid residues in length.

75. The method of claim 67, comprising the further step of converting into peptidomimietics, one or more test peptides which inhibits growth of the target microorganism.

76. The method of claim 67 or 75, comprising the further step of formulating, with a pharmaceutically acceptable carrier, one or more test peptides or peptidomimetics which inhibit growth of the target microorganism.

77. A method for preventing or treating infection of an animal by a microorganism, comprising administering to the animal a pharmaceutical preparation of claim 76.

78. A method for modulating an angiogenic process in an animal, comprising administering to the animal a pharmaceutical preparation of claim 46.

79. A construct as shown in Figure 1, 2 or 3.